

PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the application of:

Attorney Docket No.: 44374.12.3

Harry C. Sweere

Application No.: 10/759,840

Examiner: Sterling, Amy Jo

Filed: January 17, 2004

Group Art Unit: 3632

For: SUPPORT ARM

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RESPONSE TO FINAL OFFICE ACTION

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Commissioner for Patents  
PO Box 1450  
Alexandria, VA 22313-1450

In response to the Final Office Action mailed November 21, 2006, please amend the above-identified application as set forth below.

**Amendments to the Claims** begin on page 2 of this paper.

**Remarks** begin on page 12 of this paper.

## In the Claims

### Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

#### Listing of Claims:

1-6. (cancelled)

7. (currently amended) A support arm, comprising:

a first strut having a proximal portion;

a proximal link pivotally coupled to the proximal portion of the first strut at a first proximal joint, the proximal link comprising a cam, wherein the first strut is rotatable relative to the cam about the first proximal joint;

a distal link pivotally coupled to a distal portion of the first strut at a first distal joint, wherein the first strut is rotatable relative to the distal link about the first distal joint; and

a cam follower coupled to the first strut, the cam follower contacting a cam surface of the cam at a first contact point; the cam and the cam follower cooperating to apply a cam moment to the first strut; and the cam moment being sufficient to balance a load supported by the distal link, further comprising a means for urging the cam follower against the cam surface of the cam wherein the means for urging the cam follower against the cam surface of the cam comprises a spring, and further comprising an adjustment mechanism for varying a characteristic of the spring ~~The support arm of claim 6,~~ wherein the adjustment mechanism comprises a spring plate coupled to the spring.

8. (original) The support arm of claim 7, wherein the adjustment mechanism comprises a screw for adjusting a position of the spring plate.

9. (original) The support arm of claim 8, wherein the screw threadingly engages a threaded portion of the spring plate.

10. (cancelled)

11. (currently amended) The support arm of claim 20[[10]], wherein the cam moment varies as a function of a trigonometric SIN of the strut angle when the first strut rotates relative to the cam.

12. (original) The support arm of claim 11, wherein the cam moment varies in proportion to a trigonometric SIN of the strut angle when the first strut rotates relative to the cam.

13-19. (canceled)

20. (Currently Amended) A support arm, comprising:  
a first strut having a proximal portion;  
a proximal link pivotally coupled to the proximal portion of the first strut at a first proximal joint, the proximal link comprising a cam, wherein the first strut is rotatable relative to the cam about the first proximal joint;

a distal link pivotally coupled to a distal portion of the first strut at a first distal joint,  
wherein the first strut is rotatable relative to the distal link about the first distal joint; and  
a cam follower coupled to the first strut, the cam follower contacting a cam surface of the  
cam at a first contact point; the cam and the cam follower cooperating to apply a cam moment to  
the first strut; and the cam moment being sufficient to balance a load supported by the distal link,  
wherein a strut angle is defined by a longitudinal axis of the first strut and a direction of  
gravitational pull, a contact angle is defined by a line that is perpendicular to the longitudinal  
axis of the first strut and a tangent line that is generally tangent to both the cam follower and the  
cam surface and that extends through the first contact point, the cam provides a reaction force  
supporting the cam follower when the cam follower is urged against the cam, the cam moment is  
provided by a moment creating component of the reaction force, and ~~The support arm of claim~~  
~~19, wherein~~ the cam is shaped so that the moment creating component of the reaction force  
varies as the first strut rotates relative to the cam.

21. (currently amended) The support arm of claim 20 ~~[[19]]~~, wherein the moment  
creating component of the reaction force varies as a function of the contact angle as the first strut  
rotates relative to the cam.

22. (currently amended) The support arm of claim 20 ~~[[18]]~~, wherein the cam is  
shaped so that the contact angle varies as the first strut rotates relative to the cam.

23. (original) The support arm of claim 22, wherein the cam is shaped so that a trigonometric TAN function of the contact angle varies as a function of a trigonometric SIN of the strut angle when the first strut rotates relative to the cam.

24. (currently amended) A support arm, comprising:  
a first strut having a proximal portion;  
a proximal link pivotally coupled to the proximal portion of the first strut at a first proximal joint, the proximal link comprising a cam, wherein the first strut is rotatable relative to the cam about the first proximal joint;  
a distal link pivotally coupled to a distal portion of the first strut at a first distal joint, wherein the first strut is rotatable relative to the distal link about the first distal joint; and  
a cam follower coupled to the first strut, the cam follower contacting a cam surface of the cam at a first contact point; the cam and the cam follower cooperating to apply a cam moment to the first strut; and the cam moment being sufficient to balance a load supported by the distal link,  
~~The support arm of claim 1,~~ wherein the cam is shaped so that a deflection of a spring varies as the first strut rotates relative to the cam.

25. (original) The support arm of claim 24, wherein the deflection of the spring varies as a function of a trigonometric SIN of the strut angle when the first strut rotates relative to the cam.

26. (currently amended) A support arm, comprising:  
a first strut having a proximal portion;

a proximal link pivotally coupled to the proximal portion of the first strut at a first proximal joint, the proximal link comprising a cam, wherein the first strut is rotatable relative to the cam about the first proximal joint;

a distal link pivotally coupled to a distal portion of the first strut at a first distal joint, wherein the first strut is rotatable relative to the distal link about the first distal joint; and

a cam follower coupled to the first strut, the cam follower contacting a cam surface of the cam at a first contact point; the cam and the cam follower cooperating to apply a cam moment to the first strut; and the cam moment being sufficient to balance a load supported by the distal link,  
~~The support arm of claim 1,~~ wherein the cam is shaped so that a radius of the cam varies when the first strut rotates relative to the cam.

27. (previously presented) The support arm of claim 26, wherein the cam is shaped so that the radius of the cam varies as a function of a trigonometric SIN of the strut angle when the first strut rotates relative to the cam.

28. (currently amended) A support arm, comprising:

a first strut having a proximal portion;

a proximal link pivotally coupled to the proximal portion of the first strut at a first proximal joint, the proximal link comprising a cam, wherein the first strut is rotatable relative to the cam about the first proximal joint;

a distal link pivotally coupled to a distal portion of the first strut at a first distal joint, wherein the first strut is rotatable relative to the distal link about the first distal joint; and

a cam follower coupled to the first strut, the cam follower contacting a cam surface of the cam at a first contact point; the cam and the cam follower cooperating to apply a cam moment to the first strut; and the cam moment being sufficient to balance a load supported by the distal link,  
~~The support arm of claim 1,~~ wherein the cam is shaped so that a radius of curvature of the cam varies when the first strut rotates relative to the cam.

29. (original) The support arm of claim 28, wherein the cam is shaped so that a radius of curvature of the cam varies as a function of a trigonometric SIN of the strut angle when the first strut rotates relative to the cam.

30. (currently amended) The support arm of claim 20[[13]], wherein the cam is shaped such that the contact angle changes when the first strut is rotated relative to the cam.

31. (currently amended) The support arm of claim 28[[1]], wherein a spring is extended as the first strut rotates so that the first distal joint moves in a downward direction.

32. (currently amended) The support arm of claim 28[[1]], wherein a spring is compressed as the first strut rotates so that the first distal joint moves in a downward direction.

33. (original) The support arm of claim 32, wherein the spring comprises a coil spring.

34-37. (cancelled)

38. (currently amended) The support arm of claim 28 [[1]], wherein the cam surface has a substantially continually changing slope.

39. (currently amended) A support arm, comprising:  
a first strut having a proximal portion;  
a proximal link pivotally coupled to the proximal portion of the first strut at a first proximal joint, the proximal link comprising a cam, wherein the first strut is rotatable relative to the cam about the first proximal joint;  
a distal link pivotally coupled to a distal portion of the first strut at a first distal joint, wherein the first strut is rotatable relative to the distal link about the first distal joint; and  
a cam follower coupled to the first strut, the cam follower contacting a cam surface of the cam at a first contact point; the cam and the cam follower cooperating to apply a cam moment to the first strut; and the cam moment being sufficient to balance a load supported by the distal link.  
~~The support arm of claim 1,~~ wherein the cam surface has a substantially continually changing radius of curvature.

40. (currently amended) A support arm, comprising:  
a first strut having a proximal portion;  
a proximal link pivotally coupled to the proximal portion of the first strut at a first proximal joint, the proximal link comprising a cam, wherein the first strut is rotatable relative to the cam about the first proximal joint;



a distal link pivotally coupled to a distal portion of the first strut at a first distal joint,  
wherein the first strut is rotatable relative to the distal link about the first distal joint; and

a cam follower coupled to the first strut, the cam follower contacting a cam surface of the  
cam at a first contact point; the cam and the cam follower cooperating to apply a cam moment to  
the first strut; and the cam moment being sufficient to balance a load supported by the distal link,  
~~The support arm of claim 1,~~ wherein the cam has a substantially continually changing radius.

41. (canceled)

42. (currently amended) The support arm of claim 40[[1]], further comprising a  
second strut having a proximal portion pivotally coupled to the proximal link at a second  
proximal joint and a distal portion pivotally coupled to the distal link at a second distal joint,  
wherein the first strut, the second strut, the proximal link, and the distal link form a  
parallelogram.

43. (canceled)

44. (currently amended) A support arm, comprising:  
a first strut having a proximal portion;  
a proximal link pivotally coupled to the proximal portion of the first strut at a first  
proximal joint, the proximal link comprising a cam, wherein the first strut is rotatable relative to  
the cam about the first proximal joint;

a distal link pivotally coupled to a distal portion of the first strut at a first distal joint,  
wherein the first strut is rotatable relative to the distal link about the first distal joint; and

a cam follower coupled to the first strut, the cam follower contacting a cam surface of the  
cam at a first contact point; the cam and the cam follower cooperating to apply a cam moment to  
the first strut; and the cam moment being sufficient to balance a load supported by the distal link,  
further comprising a means for urging the cam follower against the cam surface of the cam  
wherein the means for urging the cam follower against the cam surface of the cam comprises a  
spring, and further comprising an adjustment mechanism for varying a characteristic of the  
spring ~~The support arm of claim 6,~~ wherein the adjustment mechanism varies a pre-load of the  
spring.

45. (cancelled)

46. (currently amended) A support arm, comprising:

a first strut having a proximal portion;

a proximal link pivotally coupled to the proximal portion of the first strut at a first  
proximal joint, the proximal link comprising a cam, wherein the first strut is rotatable relative to  
the cam about the first proximal joint;

a distal link pivotally coupled to a distal portion of the first strut at a first distal joint,  
wherein the first strut is rotatable relative to the distal link about the first distal joint; and

a cam follower coupled to the first strut, the cam follower contacting a cam surface of the  
cam at a first contact point; the cam and the cam follower cooperating to apply a cam moment to  
the first strut; and the cam moment being sufficient to balance a load supported by the distal link,

further comprising a means for urging the cam follower against the cam surface of the cam  
wherein the means for urging the cam follower against the cam surface of the cam comprises a  
spring, and further comprising an adjustment mechanism for varying a characteristic of the  
spring ~~The support arm of claim 6,~~ wherein the adjustment mechanism varies a length of the  
spring.

## REMARKS

Applicant has carefully reviewed the Final Office Action mailed November 21, 2006. By this Amendment, claims 7, 11, 20-22, 24, 26, 28, 30-32, 38-40, 42, 44, and 46 are amended, and claims 1-6, 10, 13, 18-19, 34-36, and 45 are canceled. For any fees that are deemed necessary following submittal of this Amendment, or any refund that may be due, the undersigned hereby authorizes such fees to be charged or refunds to be credited to our deposit account, Deposit Account No. 061910.

Applicant acknowledges and appreciates the Examiner's indication of allowable subject matter in claims 7-9, 20-30, 39, 40, 44 and 46. In order to obtain allowance on allowable claims at the earliest possible date, Applicant has amended the claims above to claim the subject matter the Examiner indicated as allowable. Specifically, claim 7 has been rewritten in independent form to include the subject matter of previous claims 6, 5, 2, and 1, claim 20 has been rewritten in independent form to include the subject matter of previous claims 19, 18, 13, 10, and 1, claims 24, 26, 28, 39, and 40 have each been rewritten in independent form to include the subject matter of previous claim 1, and claims 44 and 46 have each been rewritten in independent form to include the subject matter of previous claims 6, 5, 2, and 1. Further, several dependent claims have been amended to depend from one of these rewritten independent claims and the withdrawn claims have been cancelled. Accordingly, it is believed this application is now in condition for allowance and prompt allowance of this application is respectfully requested.

It should be noted that Applicant believes previous claim 1 was patentably distinct over the Mileos et al. reference cited by the Examiner, and expressly reserves the right to pursue the originally filed claims in one or more continuation applications.

If Examiner believes that prosecution of the present application can be advanced by a telephonic interview, the undersigned would welcome a call at the number listed below.

The Commissioner is hereby authorized to charge payment of any additional fees under or credit any overpayment to Deposit Account No. 06-1910.

Dated: Feb. 21, 2007

Respectfully submitted,



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